Biological monitoring of the tobacco smoke-related exposure to benzene.

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Active smoking significantly contributes to the benzene burden of non-occupationally exposed persons. We investigated the benzene exposure in 69 volunteers (42 nonsmokers and 27 smokers) by measuring their urinary excretion of *trans,trans*-muconic acid (ttMA) and phenylmercapturic acid (PhMA) as biomarkers. The mean urinary excretion of PhMA was 0.40 and 2.35 µg/24 h for nonsmokers and smokers, respectively. The corresponding excretion levels for ttMA were 167 and 153 µg/24 h. Two nonsmokers showed extremely high ttMA levels (2242 and 1042 µg/24 h), probably due to the ingestion of the food preservative sorbic acid. After exclusion of these two subjects, the mean urinary ttMA level for the group nonsmokers was 93 µg/24 h, which is significantly different form that of smokers. The correlation between ttMA and PhMA in our population (N = 67) was significant ($r = 0.38$, $p < 0.01$). In smokers, both biomarkers were significantly correlated with the number of cigarettes smoked per day and with urinary and plasma cotinine. PhMA levels tended to be lower in subjects with both GSTT1 alleles deleted. We conclude that both PhMA and ttMA are suitable biomarkers to measure the daily benzene burden in non-occupationally exposed subjects.